



Stopping Sight Distance

I. Introduction

A. Purpose

To revise Washington State Department of Transportation (WSDOT) policies on stopping sight distance.

B. References

A Policy on Geometric Design of Highways and Streets (Green Book), 2001,
American Association of Highway and Transportation Officials
(AASHTO)

Design Manual, M 22-01, WSDOT

C. Background

The 2001 edition of *A Policy on Geometric Design of Highways and Streets* revised the method of calculating and applying stopping sight distance. Changes were made to the calculation of the stopping distance and to the object height.

The stopping distance calculation changed from an assumed tire/pavement coefficient of friction to a constant deceleration rate. Previously, the stopping distance was based on a coefficient of friction (f) that varied from 0.40 at 20 mph to 0.28 at 70 mph. The new distances are based on a deceleration rate of 11.2 ft/sec^2 ($f=0.35$) for all speeds. Both methods include 2.5 sec perception/reaction time. Changes at low speeds resulted in only minor changes. At high speeds, the distance is reduced by as much as 140 ft. The new AASHTO stopping sight distances are adopted by WSDOT.

AASHTO increased the object height from 6 in. to 2 ft. However, because objects with a height between 6 in. and 2 ft may be perceived as hazards that would likely result in an erratic maneuver, the new object height is not adopted by WSDOT. The 2 ft height will only be considered on a case-by-case basis with a deviation.

The stopping sight distances on grade were changed to use the new deceleration rate. The new stopping sight distances on grade are adopted by WSDOT.

The decision sight distances have changed as a result of the change in the method of calculating the stopping distance. The new decision sight distances are adopted by WSDOT.

D. Implementation

This change is effective on the date of this supplement and will expire when the changes are incorporated in the *Design Manual*.

These changes apply to *Design Manual* Chapter 650, "Sight Distance" only.

II. Instructions

Revise *Design Manual* Chapter 650 as follows:

1. Replace Figure 650-2 with the following:

Design Speed (mph)	Design Stopping Sight Distance (ft)	K_c	K_s	VCL_m (ft)
25	155	18	25	75
30	200	30	36	90
35	250	47	49	105
40	305	70	63	120
45	360	98	78	135
50	425	136	96	150
55	495	184	115	165
60	570	244	136	180
65	645	313	157	195
70	730	401	180	210
80	910	623	231	240

Design Stopping Sight Distance
Figure 650-2

2. Revise Figure 650-3, by changing the "Existing Stopping Sight Distance (ft.)" at 25 mph to 155, $K_c=18$, $K_s=25$. Values for other speeds are unchanged.
3. Do not use the graphs on *Design Manual* Figures 650-7 through 650-9 because the stopping sight distance values used are no longer correct. The equations listed on these figures are unchanged and are to be used with the distances in revised Figure 650-2.

4. Replace Figure 650-4 with the following:

Design Speed (mph)	Stopping Sight Distance (ft)					
	Down Grade			Up Grade		
	-3%	-6%	-9%	3%	6%	9%
25	158	165	173	147	143	140
30	205	215	227	190	184	179
35	258	271	288	237	229	222
40	315	333	354	289	278	269
45	378	401	428	345	331	320
50	447	474	508	405	389	375
55	520	553	594	470	450	433
60	599	638	687	539	515	495
65	683	729	786	612	585	561
70	772	826	892	690	658	631
80	966	1037	1123	860	818	782

**Design Stopping Sight Distance
on Grades**

Figure 650-4

For stopping sight distances on grades between those listed, interpolate between the values given or use the following equation:

$$D = 1.47Vt + \frac{V^2}{30 \left[\left(\frac{a}{32.2} \right) \pm \frac{G}{100} \right]}$$

Where: V = Design speed (mph)
 t = Perception/reaction time (2.5 sec)
 a = Deceleration rate (11.2 ft/sec²)
 G = Grade (%)

5. Replace Figure 650-5 with the following:

Design Speed (mph)	Decision Sight Distance for Maneuvers (ft)				
	A	B	C	D	E
30	220	490	450	535	620
35	275	590	525	625	720
40	330	690	600	715	825
45	395	800	675	800	930
50	465	910	750	890	1030
55	535	1030	865	980	1135
60	610	1150	990	1125	1280
65	695	1275	1050	1220	1365
70	780	1410	1105	1275	1445
80	970	1685	1260	1455	1650

Decision Sight Distance

Figure 650-5